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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Patent Application No. 09/899,183

Applicant: YAMAMUKA et al.

Filed: July 6, 2001

TC/AU: 1763

Examiner: R. Bueker

Docket No.: 401278

Customer No.: 23460

TRANSMITTAL OF
APPELLANTS' APPEAL BRIEF

U.S. Patent and Trademark Office
Customer Service Window, Mail Stop Appeal Brief - Patents
Randolph Building
401 Dulany Street
Alexandria, VA 22314

Dear Sir:

In accordance with 37 CFR 41.37, appellants hereby submit Appellants' Brief on Appeal.

The items checked below are appropriate:

1. Status of Appellants

This application is on behalf of ☒ other than a small entity or ☐ a small entity.

2. Fee for Filing Brief on Appeal

Pursuant to 37 CFR 41.20(2), the fee for filing the Brief on Appeal is for: ☒ other than a small entity or ☐ a small entity.

Brief Fee Due $500.00

3. Oral Hearing

☐ Appellants request an oral hearing in accordance with 37 CFR 41.47.

A separate paper requesting oral hearing is attached.

4. Extension of Time

☐ Appellants petition for a one-month extension of time under 37 CFR 1.136, the fee for which is $ 0.00.

☒ Appellants believe that no extension of time is required. However, this conditional petition is being made to provide for the possibility that appellants have inadvertently overlooked the need for a petition and fee for extension of time.

Extension fee due with this request: $

5. Total Fee Due

The total fee due is:

Brief on Appeal Fee	$500.00
Request for Oral Hearing	$ 0.00
Extension Fee (if any)	$ 0.00

Total Fee Due: $500.00

6. Fee Payment

☐ Attached is a check in the sum of $.
☒ Charge Account No. 12-1216 the sum of $500.00. A duplicate of this transmittal is attached.

7. Fee Deficiency

☒ If any additional fee is required in connection with this communication, charge Account No. 12-1216. A duplicate copy of this transmittal is attached.

Respectfully submitted,

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Date:

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Patent Application No. 09/899,183

Applicant: YAMAMUKA et al.

Filed: July 6, 2001

TC/AU: 1763

Examiner: R. Bueker

Docket No.: 401278

Customer No.: 23548

APPELLANTS' APPEAL BRIEF

U.S. Patent and Trademark Office
Customer Service Window, Mail Stop Appeal Brief - Patents
Randolph Building
401 Dulany Street
Alexandria, VA 22314

Dear Sir:

In support of the appeal from the final rejection dated June 2, 2005, Appellants now submit their Brief.

Real Party In Interest

The patent application that is the subject of this appeal is assigned to Mitsubishi Denki Kabushiki Kaisha of Tokyo, Japan.

Related Appeals and Interferences

There are no appeals or interferences that are related to this appeal.

Status of Claims

This patent application is a division of a patent application that matured into U.S. Patent 6,273,957. Claims 14-18 were originally presented for examination in this patent application. In the course of prosecution, claim 14 was cancelled, leaving claims 15-18 pending. No claim is allowed and the final rejection of all claims is appealed. The claims on appeal appear in the Claims Appendix.

Status of Amendments

A request for reconsideration, but no amendment, was submitted in response to the final rejection of June 2, 2005. A detailed Advisory Action was issued in reply to the request for reconsideration, but no claim was indicated to be allowable.

Summary of Claimed Subject Matter

The invention concerns a vaporizing device for chemical vapor deposition (CVD) apparatus and a CVD apparatus incorporating the vaporizing device. In CVD apparatus, films are typically deposited on a substrate by introducing source materials, for forming the film, into a deposition chamber in a vapor phase. The vapor phase source materials are generated in the vaporizing device by the spraying of source materials, at least partially in a liquid phase, through a nozzle. The flow of the liquid phase materials into a chamber of the vaporizing device through an orifice raises significant thermal exchange issues. Reduced temperatures may, for example, cause the flowing source material to condense on internal surfaces of the vaporizing device, producing changes in pressure and flow rate and requiring frequent cleaning of the vaporizing device. Too much thermal input from the vaporizing device may result in premature decomposition or reaction of the source materials, reducing the efficiency of the deposition process and, potentially, damaging a film that is being deposited. The vaporizing device and CVD apparatus according to the invention are aimed at solving these problems by providing controlled thermal conduction and thermal isolation of the parts of the vaporizing device.

An embodiment of a vaporizing device according to the invention is illustrated in Figures 1 and 2(a) of the patent application. Of course, the scope of the claims on appeal is not limited by this example. As shown in those two figures, the vaporizing device includes a vaporizer with a chamber defined by a chamber wall 8. A spray nozzle 7 introduces source materials into the chamber 8 at an inlet of the chamber and an outlet of the nozzle 7. As seen in the detail view of Figure 2(a), a plate 21, thinner than the wall of the chamber 8, positions the tip of the nozzle 7 at the inlet of the chamber. Since the plate is thinner than the chamber wall 8, the plate inherently limits heat flow from the chamber wall to the tip of the nozzle, providing a desired degree of thermal isolation.

The length of the tube 7 that forms the nozzle is cooled by a cooling block 18. The cooling block 18 is in physical contact with a portion of the spray nozzle 7 adjacent the plate

21. The cooling block surrounds the spray nozzle as well. That cooling block 18, in the depicted embodiment, is cooled by a coolant that flows through pipes 20 from a cooling device 19. The flow of the coolant helps maintain the nozzle at a fixed temperature as the source materials flow through the nozzle. Finally, the heat conduction restricting region 17, interposed between the wall 8 of the vaporizing chamber and the cooling block 18, provides further thermal isolation between the chamber wall 8 and spray nozzle 7 and the cooling block 18. The heat conduction restricting means may be an evacuated space that inherently has low thermal conductivity.

The CVD apparatus according to claim 17 includes the vaporizing device of claim 15 and also includes a reaction chamber to which the vaporized source materials produced by the vaporizing device are supplied. In Figure 1 of the patent application that reaction chamber is element 12.

Dependent claims 16 and 18 are directed to a more complex nozzle that includes multiple tubes for supplying source materials. These nozzles are elements 23 illustrated schematically in Figures 3 and 5 and described at pages 14 and 15 of the patent application.

Grounds of Rejection to be reviewed on Appeal

Is any pending claim unpatentable over Li et al. (U.S. Patent 5,835,678, hereafter Li) in view of Zhao et al. (U.S. Patent 6,210,485, hereafter Zhao)?

Argument

The final rejection mailed June 2, 2005 includes several grounds of rejection. These issues require separate discussion, complicating analysis of the rejection. Fundamentally, Li was relied upon as the principal reference, allegedly disclosing essentially all of the features of independent claims 15 and 17, except the heat conduction restricting region between the cooling block and the chamber wall. Li allegedly either inherently or obviously discloses a cooling block, as in the invention, that is in physical contact with a part of the spray nozzle adjacent the plate. Zhao allegedly discloses a heat conduction restricting region in the form of a narrowed "neck" and, according to the rejection, it would have been obvious to have modified Li to include that neck. None of these contentions is correct so that the rejection is erroneous.

The vaporizer embodiments in Li's Figures 2, 5A, and 5B were relied upon in the rejection. Those vaporizers include conical nozzles (24 in Figure 2 of Li) having tips where the source material exits that are, in at least some of the illustrated embodiments, held in place by a plate. That plate is unnumbered in Figure 2 of Li, the only figure where such a plate is clearly present. The cooling jacket 26 of Li was compared in the rejection to the cooling block of the claims. Simple visual inspection of the three relevant figures of Li shows that, contrary to the assertion of the final rejection, there is no physical content between the nozzles of Li and the cooling jacket 26.

To counter that clearly apparent difference between the claimed invention and Li, reliance was placed on columns 12 and 13 of Li and an unreasonable, contorted interpretation of Li. Those passages describe Li's nozzles as being ultrasonic, meaning, as well known to those of skill in the art, that the nozzles are vibrated by a crystal to aid in atomizing the source materials flowing through the nozzle. Thus, the Examiner asserted that the modular nozzle assemblies of Li include not merely the conical portion, which one of skill in the art regards as consistent with the ordinary meaning of the word "nozzle", but also the driving portion shown above the conical nozzle. Using that unreasonable definition, the Examiner incorrectly concluded that the circular path from the cooling jacket and through the ultrasonic driver places the cooling block 26 "in physical contact with a portion of the spray nozzle adjacent the plate" that contacts the tip of the nozzle. That contact is expressly required by the claims. There is no such structure in Li nor suggested by Li.

The Examiner even admitted in the final rejection, at page 2, that there is no such physical contact between the cooling block 26 of Li and the Li nozzle 24. "[I]t would have been inherent or at least obvious that the cooling block of Fig. 2 [of Li] was in physical contact with the nozzle of Fig. 2." If it would have been inherent that there were such contact, that contact would have been shown in Li's figures. If it would have been obvious that there were such contact, based on the Li disclosure alone, then some suggestion, *and* motivation for modifying the figures of Li, would be found in Li. There is no such suggestion in Li and none has been cited in the prosecution of this patent application. This error in the rejection is, alone, sufficient for reversal.

The final rejection acknowledges that Li does not disclose the heat conduction restriction region of the claims. To supply that limitation, reliance was placed upon a part of Zhao's vaporizer and a purported modification of Li with that part of Zhao. In considering what might be suggested by such a modification, it is important to bear in mind all of the language of the final paragraphs of claims 15 and 17. The heat conduction restricting region,

according to the language of the claims, is between the cooling block and the vaporizing chamber wall and that region thermally isolates both the spray nozzle and the cooling block from the vaporizing chamber wall.

According to the final rejection at pages 2 and 3, since Li does not describe any structure corresponding to the heat conduction restricting region, one of skill in the art would have replaced the portion of Li's vaporizer at the thermocouple 32 with the "neck" of Zhao. Zhao identifies the "neck" 142 as an integral part of the main body 106 (Zhao at column 9, lines 32-35). An inspection of Zhao's Figure 4, cited in the final rejection, shows that a single piece of material forms the neck 142 and the wall of the vaporizing chamber 146. Zhao's nozzle 144 is disposed within, but spaced from, that material of the neck 142. While Zhao's neck is "between" the cooling block 104 of Zhao and the vaporizing chamber 146, it is equally clear that the neck is integral with the chamber wall so that it is impossible for the for Zhao's neck to provide thermal isolation of the cooling block from the chamber wall. The neck is the chamber wall! Further, any thermal isolation provided by the neck 142 of the nozzle in Zhao is incidental. The nozzle 144 is physically spaced from the neck 142. The hypothetical modification of Li with Zhao simply does not provide a structure that meets the final limitation of the two independent claims. On that basis, considered by itself, the rejection is erroneous and should be reversed.

Finally, at page 4 of the final rejection, implicitly acknowledging the failure of the rejection, the Examiner asserted that a particular definition of the word "adjacent" clinched the match between Li and the claim requirement that the cooling block be "in physical contact with a portion of the spray nozzle adjacent the plate." However, the very definition of the word "adjacent" that was supplied did not support that position. Moreover, when the context of the word "adjacent", as used in the claims, the interpretation that must be used in determining the meaning of a claim term, then this ground of rejection cannot be sustained.

According to page 4 of the final rejection, a dictionary definition attached to the final rejection showed that "adjacent" means "not far". However, the attachment showed that the meaning of the term adjacent is "lying near, close, or contiguous; adjoining; neighboring; *a motel adjacent to the highway.*" The attachment, similar to the definitions employed in distinguishing "adjoining" and "adjacent" in *International Rectifier Corp. v. IXYS Corp*, 70 USPQ2d 1209 (Fed. Cir. 2004), is illuminated by the commentary following the word "adjoining" in that attachment. According to the distinctions between the words "adjoining, adjacent, and bordering" supplied in the same column of the excerpt attached to the final

rejection, adjacent "implies being nearby or next to something else: *all the adjacent houses; adjacent angles.*"

The definition of "adjacent" applied in attempting to support the rejection is not found in the dictionary definition attached to the final rejection. The difference between the definition applied and the definition supplied by the attachment is not trivial in the context of the invention. This point can be understood by considering that dictionary excerpt. Clearly, a motel adjacent to a highway could invoke any of the definitions given for "adjacent". On the other hand, considering the explanation example, *all the adjacent houses*, it is apparent, assuming the houses to be detached, that what is meant by "adjacent" must be measured in the context of the usage. For example, in an urban setting, the adjacent house might be separated from the house of reference by portions of two contiguous lots of ground through which a property boundary line passes. The meaning, in terms of distance, of adjacent might be vastly different in the rural western United States. Clearly, when the term "adjacent" is being construed quantitatively, as in the final rejection, context establishes applicable meaning. The context of the references does not permit the definition of "adjacent" applied by the Examiner.

For example, the Examiner's interpretation of Figure 5A of Li at page 4 of the final rejection, applies the already-discussed unduly expansive interpretation of the word "nozzle" as not confined to the conical element 24 of Figure 2 of Li. Even if that error were excused, so that the "nozzle" included the rectangular driving part 24'', it is apparent that the location of physical contact between the elements 24'' and 25 in Figure 5A of Li is not "lying near, close, or contiguous; adjoining; neighboring;" i.e., adjacent, the unnumbered plate which the Examiner has imported from Figure 2 of Li into Figure 5A of Li.

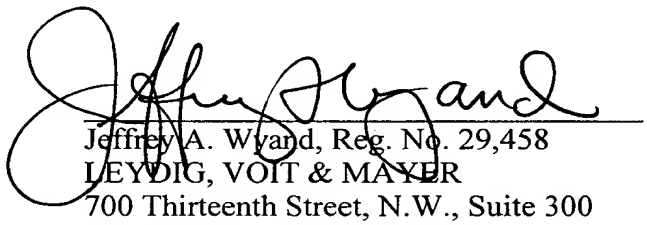
Moreover, even adopting the alleged definition of "adjacent" applied in the final rejection, it is apparent that the location of the contact between the "nozzle" and the cooling block at the top part of Figure 5A cannot be properly characterized as "not far" from the plate imported from Figure 2, in the context of Li. That context is established by the inlet 29'' and outlet 30'' for circulation of a cooling fluid flowing through the jacket 26''. Those ports are clearly widely spaced apart in context of Li, based on thermodynamic considerations. If those ports were adjacent to each other, then the cooling effect of the circulating coolant would be meaningless. Thus, thermodynamic considerations provide the context of Li for determining the applicable meaning of "adjacent" in applying Li to claims 15 and 17. That context must be used for determining "near" and "far" in the structure of that Figure 5A of Li. When that context is understood and applied, then clearly it is not rational to assert that the

area of contact between elements 24'' and 25 in Figure 5A of Li is either "close by" or "not far" from the element alleged to be a plate in that figure. Therefore, the claim term "adjacent" has not been properly construed in the context of Li and the invention, leading to an incorrect construction of claims 15 and 17 and an erroneous rejection. This further error in the rejection, like the other errors, is sufficient, by itself, for reversal of the rejection.

Conclusion

Prima facie obvious has not been established as to either of independent claims 15 and 17 and, therefore, as to any of claims 15-18. The prior art has not been reasonably interpreted in light of either the complete language of the claims or the context of the prior art. Therefore, the rejections should be reversed and all of claims 15-18 allowed.

Respectfully submitted,



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Date: December 30, 2005

Appeal_Brief (Revised 2005 12 06)

Claims Appendix

15. A vaporizing device for vaporizing chemical vapor deposition (CVD) source materials comprising:

a vaporizer for vaporizing CVD source materials by heating, the vaporizer including a chamber having a heat conductive chamber wall with an inlet for introducing the CVD source materials into the chamber;

a spray nozzle having a first end located to spray a CVD source material into the chamber through the inlet;

a plate having at least one portion thinner than the chamber wall, contacting and locating the spray nozzle relative to the inlet to spray CVD source materials into the chamber, the plate limiting thermal conduction from the chamber wall, thereby thermally insulating the spray nozzle from the chamber wall;

a cooling block in physical contact with a portion of the spray nozzle adjacent the plate and surrounding the spray nozzle for conducting heat from and cooling the spray nozzle; and

a heat conduction restricting region between the cooling block and the chamber wall, thermally isolating the spray nozzle and the cooling block from the chamber wall.

16. The vaporizing device for vaporizing CVD source materials of Claim 15, wherein the spray nozzle includes first and second coaxial tubes, the first tube for passage of a gas containing the CVD source materials and the second tube for passage of a spray gas for spraying the CVD source materials into the chamber.

17. A chemical vapor deposition (CVD) apparatus comprising:

a vaporizer for vaporizing CVD source materials by heating, the vaporizer including a chamber having a heat conductive chamber wall with an inlet for introducing the CVD source materials into the chamber;

a spray nozzle having a first end located to spray a CVD source material into the chamber through the inlet;

a plate having at least one portion thinner than the walls of the chamber, contacting and locating the spray nozzle relative to the inlet to spray CVD source materials into the chamber, the plate limiting thermal conduction from the chamber wall, thereby thermally insulating the spray nozzle from the chamber wall;

a cooling block in physical contact with a portion of the spray nozzle adjacent the plate and surrounding the spray nozzle for conducting heat from and cooling the spray nozzle;

a heat conduction restricting region between the cooling block and the chamber wall, thermally isolating the spray nozzle and the cooling block from the chamber wall; and

a reaction chamber receiving the CVD source materials vaporized by the vaporizing device for forming a film on a substrate through reaction of the CVD source materials.

18. The CVD apparatus of Claim 17, wherein the spray nozzle includes first and second coaxial tubes, the first tube for passage of a gas containing the CVD source materials and the second tube for passage of a spray gas for spraying the CVD source materials into the chamber.

Evidence Appendix

No evidence was presented in the prosecution of the patent application pursuant to 37 CFR 1.130, 1.131, or 1.132.

Related Proceedings Appendix

There are no related proceedings.